Claims

1   A method of phytoremediating an environment which is
contaminated with at least one heavy metal or oil hydrocarbon,
which method comprises:
(a) providing a transgenic plant, which plant expresses at least
one heterologous nucleic acid encoding an enzyme having
rhamnosyltransferase activity,
(b) planting or locating said transgenic plant in said environment.

2   A method as claimed in claim 1 wherein the environment is
contaminated with both heavy metal and oil hydrocarbon pollutants.

3   A method as claimed in claim 1 or claim 2 wherein the plant
expresses two different heterologous enzymes having
rhamnosyltransferase activity.

4   A method of producing a transgenic plant having improved
phytoremediating properties with respect to heavy metal or oil
hydrocarbon pollutants, the method comprising:
(i) introducing into a plant cell a heterologous nucleic acid
vector encoding at least one enzyme having rhamnosyltransferase
activity,
(ii) causing or allowing recombination between the nucleic acid
vector and the plant cell genome to introduce the nucleotide
sequence encoding the enzyme having rhamnosyltransferase activity
into the plant genome,
(iii) regenerating the transformed plant cell into a plant,
such that the or each enzyme is expressed in the plant.

5   A method as claimed in claim 4 wherein the vector encodes
two different enzymes having rhamnosyltransferase activity.

6   A method as claimed in any one of the preceding claims
wherein the phytoremediating is either one or both of
phytostabilizing heavy metal pollutants or phytodegrading oil
hydrocarbons.

7   A method as claimed in claim 6 wherein the heavy metal is selected from the list consisting of: lead, copper, cadmium, nickel, mercury, arsenic, selenium strontium or zinc.

5   8   A method as claimed in any one of the preceding claims wherein the oil hydrocarbon is crude oil.

9   A method as claimed in any one of the preceding claims wherein the oil hydrocarbon is the C_{12}-C_{18} hydrocarbon fraction of
10   crude oil.

10   A method as claimed in any one of the preceding claims wherein the metal accumulation coefficient (C_{MA}) of the plant: (C_{MA} = $[C_s]/[C_r]$), where
15   where the heavy metal is copper present at 1000 mg/kg, and
C_s is the copper concentration in shoot, and
C_r is the copper concentration in the rhizosphere,
is less than 20% of that of a corresponding non-transgenic plant,

20   11   A method as claimed in any one of the preceding claims wherein the or each enzyme is involved in the synthesis of monorhamnolipids.

12   A method as claimed in claim 11 wherein the or each enzyme is
25   selected from the list consisting of: rhlA gene or rhlB gene.

13   A method as claimed in claim 12 wherein the rhlA and rhlB gene are derived from a procaryote.

30   14   A method as claimed in claim 13 wherein the rhlA and rhlB gene are derived from Pseudomonas aeruginosa.

15   A method as claimed in any one of the preceding claims wherein the plant is selected from the list consisting of:
35   Nicotiana tabacum; Arabidopsis thaliana.

16   A recombinant plant vector which comprises a nucleotide sequence encoding an enzyme having rhamnosyltransferase activity.

17   A vector as claimed in claim 16 wherein the vector encodes
two different enzymes having rhamnosyltransferase activity.

5   18   A vector as claimed in claim 16 or claim 17 wherein the or
each enzyme is selected from the list consisting of: *rh1A* gene or
rh1B gene.

19   A vector as claimed in claim 18 wherein the *rh1A* and *rh1B*
10 gene are derived from a procaryote.

20   A vector as claimed in claim 19 wherein the *rh1A* and *rh1B*
gene are derived from *Pseudomonas aeruginosa*.

15 21   A plant host cell containing or transformed with a
heterologous vector of any one of claims 16 to 20.

22   A transgenic plant transformed with a heterologous vector of
any one of claims 16 to 20, or which is a clone, or selfed or
20 hybrid progeny or other descendant of said transgenic plant, which
in each case expresses at least one heterologous nucleic acid
encoding an enzyme having rhamnosyltransferase activity,

23   A plant as claimed in claim 22, wherein the plant is selected
25 from the list consisting of: *Nicotiana tabacum; Arabidopsis
thaliana*.

24   Use of a heterologous vector of any one of claims 16 to 20,
in a method of improving the phytoremediating properties of a plant
30 with respect to heavy metal or oil hydrocarbon pollutants.